IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Takenobu Sunagawa et al. Group Art Unit: 1713

Serial Number: 09/926,085 Examiner: Tatyana Zalukaeva

Filed: August 27, 2001

For: PROCESSING AID FOR THERMOPLASTIC RESIN AND THERMOPLASTIC RESIN COMPOSITION CONTAINING THE SAME

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
Washington, D.C. 20006

Sir:

Takenobu Sunagawa residing at 2-2-6-133, Terauchi, Toyonaka-shi, Osaka, Japan duty deposes and says:

1. That he graduated from Department of Applied Chemistry, Faculty of Engineering, OSAKA INSTITUTE OF TECHNOLOGY, Osaka, Japan, in the year 1994, and he received the degree of Master of Process Engneering from GRADUATE SCHOOL OF OSAKA UNIVERSITY, Osaka, Japan in the year 1996;

2. That since 1996, he has been employed in the capacity of KANEKA CORPORATION.;

3. That from 1996, he has been engaged in development for synthesis of resin.;

4. That he has read and is familiar with the instant application for United States Letters Patent and Office Action thereto mailed January 20, 2004.; and

5. That he has made experiments in order to show that when at most 5 % by weight of GMA is compounded in the monomers in total in a processing aid, the resin composition in which the processing aid is added has an excellent roll peeling property.

6. Experiments were carried out by the following procedure.

Experiment 1

Hereinafter, "parts" represents "parts by weight" based on 100 parts by weight of the monomers in total and "% by weight" represents a weight ratio of each monomer in the monomers in total, unless otherwise specified.

A reactor equipped with a stirrer and a condenser was charged with 200 parts of distilled water, 1.2 parts of sodium dioctylsulfosuccinate, 0.01 part of sodium ethylenediaminetetraacetate, 0.005 part of ferrous sulfate heptahydrate, and 0.5 part of sodium formaldehyde hydrosulfite. Then, after inside of the reactor was replaced with nitrogen gas, the reactor was heated to 60°C with stirring. Next, to this was continuously added for two hours a mixture comprising 24 % by weight of methyl methacrylate (MMA), 15 % by weight of styrene (St) and 0. 2 part of tertiary- butylhydroperoxide (TBHP). One hour after completion of the addition, to this was further continuously added for three hours a mixture comprising 35 % by weight of St, 15 % by weight of butyl acrylate (BA), 1.0 % by weight of glycidyl methacrylate (GMA), 1.0 part of 2-ethylhexyl thioglycolate (2EHTG) and 0.7 part of TBHP. One hour after completion of the addition, to this was further continuously added for thirty minutes a mixture comprising 10 % by

weight of MMA and 0.1 part of TBHP. After completion of the addition, this was further stirred for one hour, and then cooled to obtain a copolymer in latex.

The obtained latex was coagulated by an aqueous solution of calcium chloride. After the latex was heated up to 90°C, the latex was filtrated with a centrifugal dehydrator. The obtained dehydrated cake of the copolymer was washed with water and dried for 15 hours at 50°C with a parallel-flow dryer to obtain a white powdery polymer sample (1) prepared by three steps polymerization. A weight average molecular weight of the obtained sample was 80,000 measured by GPC.

The obtained sample was subjected to the following evaluation on the roll peeling property. Table 1 shows the results.

(Mothod for evaluating roll peeling property)

In order to evaluate the roll peeling property, there was kneaded a mixture comprising 100 parts of poly(vinyl chloride) (Kane vinyl S1007 available from Kaneka Corp.), 1 part of the above-obtained sample, 2.0 parts of a stabilizer of octyl tin mercaptan (TVS #8831 available from Nitto Kasei K.K.), 1.0 part of a lubricant (KALCOHL 8668 available from Kao Corp.), and 3.0 parts of dioctyl phthalate (DOP) by using a 6-inch roll at 190°C, to evaluate peeling property from the roll surface after 10 minutes. The evaluation was made in accordance with ten ranks. Based upon the following criteria, 10 was evaluated as the highest peeling property, and 1 was evaluated as the lowest.

10: A molten sheet maintains a state removable from a hot roll surface for 10 minutes or more.

5: A molten sheet maintains a state removable from a hot roll surface for at least 5 minutes to less than 6 minute.

1: A molten sheet is maintained removable from a hot roll surface for 2 minutes or less.

Experiment 2 to 5

According to compositions shown in Table 1, samples (2) to (5) were obtained by the same manner as in Experiment 1. Herein, a compounding ratio of monomers except GMA in each Experiment was adjusted to approximately the same ratio as in Experiment 1.

The obtained samples were subjected to the above-mentioned evaluation on the roll peeling property. Table 1 shows the results.

Result and Discussion

In Experiments 1 to 3, wherein the compounding ratio of GMA is at most 5 % by weight in the monomers in total, the roll peeling property of the obtained resin composition was as excellent as 9 to 10. On the other hand, in Experiments 4 and 5, wherein the compounding ratio of GMA is more than 5 % by weight in the monomers in total, the roll peeling property of the obtained resin composition was as low as 4 to 5.

In this way, when at most 5 % by weight of a (meth)acrylate having an oxygen atom in addition to an ester bond was compounded in the monomers in total in a processing aid, the resin composition in which the processing aid was added has an excellent roll peeling property.

TABLE 1

Experiment No.	Sample	Composition of mixture before polymerization (% by weight)						Chain transfer agent (parts)	Organic peroxide (parts)	Roll peeling property	Weight average molecalar weight
		Polymer at first step		Polymer at second step			Polymer at third step				
		MMA	St	BA	St	GMA	MMA	2EHTG	TBHP		
1	(1)	24	15	15	35	1	10	1.0	1.0	10	80,000
2	(2)	23	15	15	34	3	10	1.0	1.0	9	80,000
3	(3)	23	15	14	34	4	10	1.0	1.0	9	90,000
4	(4)	22	14	13	32	10	9	1.0	1.0	5	80,000
5	(5)	21	14	13	31	12	9	1.0	1.0	4	80,000

The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 7th day of April, 2004

by Takenobu Sunagawa

Takenobu Sunagawa

We, the undersigned witnesses, hereby acknowledge that Takenobu Sunagawa is personally known to us and did execute the foregoing Declaration in our presence on:

Date: April 7, 2004 Witness Norio Nagata

Date: April 7, 2004 Witness Mamoru Kadokura